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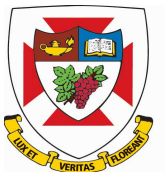

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Economic Transition and the Motherhood Wage Penalty in Urban China: Investigation Using Panel Data

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Economic Transition and the Motherhood Wage Penalty in Urban China: Investigation Using Panel Data

Abstract: China's economic transition has fundamentally changed the mechanisms for allocating and compensating labor. This paper investigates how the economic transition has affected the wage gap between mothers and childless women in urban China using panel data for the period 1990-2005. The results show that overall, mothers earned considerably less than childless women; additionally, the wage penalties for motherhood went up substantially from the gradualist reform period (1990-1996) to the radical reform period (1999-2005). The results also show that that although motherhood does not appear to have a significant wage effect for the state sector, it imposes substantial wage losses for mothers in the non-state sector. These findings suggest that the economic transition has shifted part of the cost of child-bearing and -rearing from the state and employers back to women in the form of lower earnings for working mothers.

Key words: Economic Transition, Gender, Motherhood Wage Penalty, China
JEL classification：J13, J31, O10, R20

1. Introduction

It is well recognized that women's reproductive activities, typically child-bearing and -rearing, are crucial to human capabilities and well being. Caring for children, through its contribution to human and social capital investment, also plays a pivotal role in generating and sustaining economic growth (Folbre and Nelson 2000). However, women's child-bearing and -rearing role tends to disadvantage them in the labor market and is a major factor in their weak position in terms of occupations and earnings (Elson 1999). Many empirical analyses of industrial countries find that mothers earn less than childless women.[1] In the literature, the wage losses associated with motherhood are termed "the motherhood wage penalty" (Budig and England, 2001).

The motherhood wage penalty can be attributed to various factors. First, in the absence of regulations on maternity/paternity leave, child-bearing and -rearing interrupts women's labor force participation, and women's intermittent labor force participation reduces their human capital investment and therefore lowers their earnings (Mincer and Polachek, 1974; Jones and Makepeace, 1996; Royalty, 1998). Second, child-rearing often restricts mothers to types of paid work that are easier to combine with parenting, such as part-time work and home-based work (Becker, 1991; Polachek, 1981). Third, mothers may earn less because the time and energy devoted to childrearing inevitably reduce the amount of effort available for them to devote to paid work (Becker, 1991). Finally, believing that mothers always allow domestic responsibilities to interrupt their paid work, employers may discriminate against

[1] A selective list of references includes Blau and Kahn (1992), Korenman and Neumark (1992), Waldfogel (1995, 1998a, 1998b, 1999), Jacobsen, Pearce III, and Rosenbloom (1999), Lundberg and Rose (2000), Budig and England (2001), Anderson, Binder and Krause (2002), Anderson, Binder and Krause (2003), and Sasse (2005) for the United States; Waldfogel (1999), and Joshi, Paci and Waldfogel (1999) for the United Kingdom; Waldfogel (1999) and Phipps, Burton and Lethbrigde (2001) for Canada; and Waldfogel (1999) for Australia, Germany and Finland. However, the findings on the motherhood wage penalty are not clear-cut. Albrecht et al. (1999) and Gupta and Smith (2002) find that motherhood has no effect on earnings in Sweden and Demark and attribute the absence of the motherhood wage penalty to the implementation of "family-friendly" policies in these countries.

mothers in hiring and promotion (Waldfogel, 1998b). The earnings losses associated with motherhood are an important source of gender earnings inequality (Sasser, 2005; Joshi et al., 1999).

This paper investigates the motherhood wage penalty in urban China. China has undergone a transition from a centrally planned economy to a market economy over the past three decades. This economic transition has brought about fundamental changes in the labor market, reshaping the ways in which women's reproductive activities are valued and rewarded. Although the gender implications of the economic transition have been the subject of considerable attention, much of the literature focuses on such factors as human capital investment, sex segregation, and discrimination,[2] paying little attention to the changes associated with women's reproductive activities. In this paper, we examine how the economic transition has affected the wage gap between mothers and childless women. To our knowledge, the present paper is the first analysis of the motherhood wage penalty for transitional and developing countries.

Our analysis is based on data from China's Health and Nutrition Survey (CHNS). The survey provides a national representative panel sample for the period from 1990 to 2005. Thus, we are able to control for time-invariant unobserved heterogeneity among women, which tends to bias the estimates of the motherhood effect in cross-section analyses. The rest of this paper is organized as follows. Section 2 provides an overview of the economic transition and discusses how the economic transition may affect the wage penalty for motherhood. Section 3 frames the hypotheses and introduces empirical methodologies. Section 4 describes the data. The empirical results are presented in Section 5. The paper is concluded with a summary of the main findings and a brief discussion of policy implications.

[2] See Berik, Dong and Summerfield (2007) for a literature review on gender and economic transition in China.

2. Economic Transition and the Wage Penalty for Motherhood

Under central planning, China's urban labor market was known as an "iron rice bowl" with "everyone eating from one big pot". Workers in state enterprises were employed for life and paid according to centrally regulated wage scales that were determined predominantly on the basis of workers' education and seniority (Korzec, 1992). Inspired by the Marxist view of women's emancipation as contingent on women's participation in socialized labor, women's full participation in the labor force played a key role in the leadership's attempt to alleviate discrimination against women in society (Croll, 1983). Most working-age women in the urban sector were employed full-time after school graduation. To support working mothers, resources were devoted to a publicly funded childcare system that provided care to children from the earliest months of their lives until they entered primary schools (He and Jiang, 2008). In addition to on-site childcare, the employers also provided working mothers with nursing rooms for breast-feeding and paid maternity/family leave (Liu et al., 2008). These family-friendly policies made it easier for mothers to combine paid work with domestic responsibilities, thereby minimizing the degree to which child-bearing and -rearing interrupted women's workforce participation. Although women remained the principal caregivers for children and other family members and their domestic burdens had the potential to leave them exhausted or distracted at work, the impact of work effort on earnings was limited because the wage differentials among workers were compressed (Meng and Kidd, 1997). In essence, the costs of social reproduction under central planning were not solely borne by women; the state and employers footed part of the bill. As a result, the wage penalty for motherhood was to be small or nonexistent under central planning.

In the late 1970s, China began to transform its economy into a market-oriented economy using a gradualist approach. In the first fifteen years of the reform process, the Chinese government sought reform within the socialist system, directing its efforts primarily to

economic decentralization, improving incentives for state workers and managers, and encouraging the development of non-state sectors. While the entry of rural township village enterprises (TVEs), private firms, and foreign-invested firms greatly eroded the share of state-owned enterprises (SOEs) in product markets, the public sector remained the principal employer of urban workers, accounting for more than three-quarters of total urban employment by 1995. State enterprises continued to protect workers against open unemployment and shoulder the responsibility of providing social benefits and services to employees.

The pace of the economic reforms accelerated after Deng Xiaoping's famous southern tour in 1992. The Chinese government initiated ownership reforms for public enterprises. As a result, a large number of SOEs were transformed into joint-stock companies, declared bankrupt, merged with other enterprises, or sold to private investors. In 1994, a new labor law was passed that gave employers the right to dismiss workers. In 1997, the Chinese government launched a large-scale labor retrenchment program intended to revitalize the ailing SOE sector. The SOE-sector restructuring efforts have fundamentally changed the landscape of the urban labor market, reducing the public sector's share of employment from 75.7% in 1995 to 33.4% in 2002 and putting an end to the state sector as the main source of urban employment (Dong and Xu, 2009).

Of those seen in transition economies, China's reforms are some of the most successful; they have produced impressive rates of economic growth and massive poverty reduction (Chen and Ravallion, 2004). However, an unintended consequence of the SOE-sector restructuring is that the reforms dismantled the institutional mechanisms that had internalized the costs of social reproduction and protected working mothers under central planning and did not create adequate measures to replace them (Ding et al., 2009). To be sure, the Chinese government has passed a series of regulations to protect women against labor market

discrimination in the post-reform era. For instance, the new labor law stipulates that women and men have equal employment rights, female employees are entitled to a 90-day maternity leave, and no employer should lay off female employees, lower their wages or unilaterally terminate their labor contracts for reasons of marriage, pregnancy, maternity leave, or breastfeeding. Although these "mother-friendly" regulations have been implemented in government agencies, non-profits, public organizations (e.g., schools and hospitals), and large SOEs, they have been largely ignored by private employers (Liu, et al., 2008). There are no effective mechanisms to protect mothers from being adversely affected by market discipline and discriminatory practices in the private sector. Moreover, under pressure to increase profits, enterprises are increasingly relying on piece-rate wages and performance-based bonus payments to elicit effort and discourage absenteeism. These competitive compensation schemes tend to disadvantage mothers because child-bearing and -rearing responsibilities decrease the time and energy that they have available for paid work and thereby hinder their job performance.[3]

Another far-reaching change following the SOE sector restructuring has been the substantial cutback in the support provided by the government and employers for childcare. With the drive for efficiency, the vast majority of Chinese enterprises ceased to offer subsidized childcare to employees. According to the Chinese firm social responsibility survey undertaken in 2006, enterprises that still ran kindergartens accounted for less than 20% of SOEs and only 5.7% of all enterprises (Du and Dong, 2010). Publicly funded nurseries for children aged 0-2 years have become largely non-existent (Liu, et al., 2008). With the

[3] Using firm-level data for Chinese industry in the late 1990s, Dong and Zhang (2009) find that female workers are less productive than male workers in SOEs. Given that more than 70% of female workers are mothers, as is evident in the CHNS data, child-bearing and -rearing may be a major culprit that lowers female workers' productivity. Interestingly, the authors find that the relative wage of female to male workers was higher than their relative productivity at SOEs; thus, it can be argued that female workers in the SOE sector received wage premiums.

exception of employees of government agencies, non-profit public organizations (schools and hospitals), and large SOEs that have continued to provide subsidized childcare, urban parents have had to rely on service-for-fee childcare programs to meet their needs. Thus, it has become increasingly difficult for mothers with young children to participate in the labor force. Maurer-Fazio et al. (2009) present evidence that the labor force participation rate for urban women with preschool-age children fell dramatically between 1990 and 2000 and that co-residence with grandparents became increasingly important for women looking to stay in the labor force. Du and Dong (2010) find that the sharpest decline in labor force participation occurred among women with children younger than three years of age. Additionally, a growing number of urban women have been pushed into the informal sector in which jobs are typically temporary or part-time, insecure, and low-paying (Cook and Wang 2010).

Thus, privatization and labor market deregulation associated with the SOE-sector restructuring are expected to widen the wage gap between mothers and childless women by increasing birth-related workforce interruptions, exacerbating the impediments of child-bearing and -rearing to mothers' opportunities for on-the-job training or promotion, tightening the link between earnings and job performance, and pushing mothers into the types of jobs that offer more flexibility but lower pay.

3. Hypotheses and Empirical Methodology

In the remainder of the paper, we investigate the impact of the economic transition on the motherhood wage penalty by exploring the differences between two phases of economic transition (the gradualist reform period (1990–1996) and the radical reform period (1999–2005) and identifying the differences between the state sector and the non-state sector. Based on the discussion in the previous section, we propose three hypotheses: 1. in post-reform urban China, wages are lower for mothers than for childless women; 2. the

motherhood wage penalty was greater in the radical reform period than in the gradualist reform period; and 3. the wage penalty is greater in the non-state sector than the state sector.

To test these hypotheses, we use the standard human capital wage equation modified to incorporate a motherhood dummy variable. We consider both annual wages and hourly wages given that the difference between the effects of motherhood effects for the two measures sheds light on the impact of motherhood on the labor hours supplied. An empirical challenge to obtaining consistent estimates of the motherhood wage effect is the presence of unobserved individual characteristics that may simultaneously affect wages and child-bearing decisions. For example, women with lesser ability may be more likely to have children or to have children earlier. If this is the case, the negative effect of motherhood on wages may be spurious due to unobserved heterogeneity. To control for unobserved heterogeneity, we use the panel data regression model. The model is as follows:

$$\ln w_{it} = X_{it}\beta_1 + \beta_2 Mother_{it} + v_i + \varepsilon_{it} \qquad (1)$$

where w_{it} is the individual i's annual wage (or hourly wage) in period t and X_{it} is a vector of observable characteristics that are expected to affect wages. $Mother_{it}$ is a dummy variable equal to one for all $t \geq \tau$ if a woman gave birth to a child in year τ and equal to zero otherwise. v_i represents the unobserved, time-invariant characteristics of individual i, and ε_{it} is the random error.

The motherhood dummy variable $mother_{it}$ is the variable of primary interest in the wage equation. Defined based on the first live birth a woman gave, $mother_{it}$ is an aggregate measure for motherhood for all women who have had child-bearing and -rearing experience, regardless of what age their children were or how many children they had at the time when the survey was done. The estimate for the motherhood variable takes into account not only the direct effect of bearing and raising young children but also its effect on the later years of a

mother's career. Although the adverse effect of motherhood on a woman's employment may be diminished or disappear as children grow up, its effect on earnings is long lasting; workforce interruption, missed training opportunities or delayed promotion in the early years of one's career lower one's earnings not just in the current period but in the later period. We do not control for the number of children because the vast majority of women in the sample have only one child due to the introduction of China's only-child policy in the late 1970s.[4] Thus, the coefficient of the motherhood dummy variable β_2 measures the average effect of motherhood on a woman's lifetime earnings. If motherhood has a negative effect on wages, we expect $\beta_2 < 0$.

The covariates in X include personal characteristics such as educational attainment, potential work experience and its squared term, marital status, and job characteristics such as job status (full-time versus part-time), occupations, and ownership of the firms in which women were employed. We also control for co-residence with elderly parents. Under the influence of traditional Confucian culture, living with parents or parents-in-law is a common phenomenon in Chinese families. Living with elderly parents has two opposing effects on earnings. On the one hand, parents may help women to take care of children and alleviate their domestic work burden and may thereby have a positive impact on women's earnings. On the other hand, parents may need caretaking by their daughters or daughters-in law, which may thereby increase their domestic burdens and, consequently, lower their earnings. In addition, the covariate control variables also include dummy variables for time and regional variation.

Eq. (1) is estimated using both random-effects and fixed-effects regression techniques. Empirically, random-effects and fixed-effects estimates are both consistent, but only

[4] In our sample, there are more women who have more than one child in the early sample period from 1990 to 1996 than in the later period from 1999 to 2005. As a result, our estimates may understate the impact of the economic transition on the motherhood wage penalty on a per child basis when comparing the two sample periods.

random-effects estimates are efficient if the unobserved individual effects v_i are uncorrelated with any explanatory variable including $mother_{it}$, and only fixed-effects estimates are consistent if v_i is correlated with any explanatory variable. For all models, the Hausman test is conducted to assess which model is adequate.

One concern related to the estimation of Eq. (1) is selection bias, as perceived wage offers may affect women's labor force participation decisions. If mothers whose motherhood penalty was expected to be larger were more likely to exit the labor force, our estimates would lead us to understate the motherhood penalty. Furthermore, if the deepening of the SOE reforms increased the motherhood penalty, inducing more mothers who were less productive to withdraw from the labor force, our estimates would also lead us to underestimate the impact of the economic transition. Thus, we tested the presence of selection bias using the approach developed by Wooldridge (1995) for panel data models. The test procedure is explained in the appendix. The test results (presented in Table A2 in the appendix) lead us not to reject the hull hypothesis that there is no selection bias in the annual wage earnings equation for the full sample period and the two sub-sample periods.

4. Data and Variables

This research is based on data from the six waves (1991, 1993, 1997, 2000, 2004 and 2006) of the CHNS.[5] Each survey covers about 3,800 households and about 14,000 individuals in both rural and urban areas from nine provinces: Heilongjiang, Liaoning, Shandong, Henan, Jiangsu, Hubei, Hunan, Guizhou, and Guangxi. We restrict our analysis to

[5] The CHNS is jointly sponsored by the Carolina Population Center at the University of North Carolina at Chapel Hill, the Institute of Nutrition and Food Hygiene of China and the Chinese Academy of Preventive Medicine. Detailed information about the CHNS is available at the website www.cpc.unc.edu/china/home.html. So far, the CHNS has collected data for 1989, 1991, 1993, 1997, 2000, 2004 and 2006. The data collected in 1989 are excluded from the analysis because the information on some variables in that year is incompatible with the information gathered in the following six periods.

women of prime age (between 17 and 45 years inclusive) in the urban sector, which includes cities and county centers and excludes villages in suburban and rural areas.[6] We further limit the sample to women with positive wage earnings for at least two waves to perform fixed-effects estimation. After omitting observations with missing values, the sample for analysis consists of 2,206 woman-year observations, and mothers account for 78% of the sample.

We construct two measures for the dependent variable: the annual wage and hourly wage that the respondent earned in the year prior to the survey. The annual wage includes both regular wages and bonuses measured in y*uan* and deflated by the urban consumer price index with 2006 as the base year. The hourly wage is annual wages divided by the total number of work hours in the last year.[7] Both wage variables are in log form. Because the wage variables are based on the previous year's earnings, the sample period under investigation is from 1990 to 2005 and is divided into the gradualist reform period (from 1990 to 1996) and the radical reform period (from 1999 to 2005). We analyze the impact of the economic transition by exploring the differences between the two periods and between the state and non-state sectors.

The definitions of the explanatory variables are given below. The variable of primary interest, *mother*, is derived from the response to the questions related to birth history from the Survey of Ever-Married Women Under Age 52—a supplementary survey by the CHNS. Education is measured using two dummy variables – one for university graduates and one for high-school graduates. The reference group is those who did not graduate from high school. Work experience is calculated as age minus six and minus years of schooling because the

[6] Rural villages are excluded because most married women in rural villages work primarily on family farms, and it is easier for mothers to combine work with childcare under self-employment than under wage employment.

[7] The total number of work hours is derived using the information on how many hours per day, days per week, and months per year each individual spent on paid work in the previous year as reported by the CHNS. We assume that each person worked four weeks per month.

information on actual experience is unavailable. Marital status is a dummy variable for women who have been married. A dummy variable is included for those respondents who worked part-time, defined as less than 25 hours per week. Employer ownership types are measured using three dummy variables for urban collectives, domestic private firms, and foreign joint ventures and foreign-invested firms, with government agencies, public organization, and SOEs as the reference group. In addition, in the analysis that explores the differences between the state and non-state sectors, government agencies, public organizations, and SOEs are assigned to the state sector, and the rest of the ownership types are included in the non-state sector. The variables for occupations are dummy variables for a woman's primary occupation, which involves a range of job titles including senior professional, professional, administrator and manager, office clerk, farmer, skilled worker, non-skilled worker, service worker, and driver. The descriptive statistics for the explanatory variables are presented in Table A1 in the appendix.

5. Empirical Results

5.1 Trends of Employment and Earnings

Figures 1 to 3 include based information from the CHNS, depicting three major changes in the Chinese urban labor markets over the period of investigation. First, as Figure 1 shows, the labor force participation rates for women with young children fell sharply following the SOE sector restructuring in the late 1990s. The labor force participation rate for women with children under age 6 was 90.3% in 1990 and fell to 70.8% in 2005, and the larger decline is observed for women with children under age 3 (from 89.2% to 56.6%). The contrast between women with younger children and women with children under age 6 as a whole implies that many mothers entered or re-entered the labor market one or two years after giving birth to a child, bearing the double burden of working and taking care of pre-school-aged children.

Secondly, based on Figure 2, we note that the proportion of women working part-time went up by an appreciable margin and the magnitude of change was large for mothers than childless women, although the proportion of part-time workers is consistently lower for mothers than for childless women, perhaps reflecting that more younger women took part-time jobs. Lastly, as shown in Figure 3, the proportion of women working in the non-state sector increased markedly, from 35% in 1996 to approximately 50.0% in 2005.

Table 1 presents the summary statistics for annual and hourly wages in log form by period and by sector, providing a broad picture of the changing wage differentials for childless women and mothers over the period of investigation. It is noteworthy that the raw wage gaps between the two types of women are attributable not only to the potential motherhood effect but also to the experience effect. Given that the childless women in the sample are, on average, 11 years younger than the mothers and therefore have less experience, their wages should be lower as long as the negative motherhood effect does not outweigh the positive experience effect. In Table 1, we note that the annual and hourly wages of childless women are indeed significantly lower than those of mothers for the full sample period. However, the wage differentials for the two types of women changed markedly from the 1990-1996 period to the 1999-2005 period. In the former period, the pay for childless women was significantly lower than that for mothers (by 25.4% on an annual basis and 24.3% on an hourly basis); in contrast, the wage differences for the period 1999-2005 are down to 7.7% and 4.6%, respectively, and they become statistically insignificant. Evidently, the wages of childless women grew faster than those of mothers during the post-restructuring period. A similar pattern of differences can also be observed when we compare the state and non-state sectors. In the state sector, the annual and hourly wages of childless women are significantly lower than those of mothers (by 31.8% on an annual basis and 29.2% on an hourly basis). In contrast, the wage gaps in the non-state sector are much smaller (-5.8%

and -3.6%, respectively), and none of the differences is statistically significant. Thus, relative to childless women, mothers appear to have fared poorly in the non-state sector relative to those in the state sector.

5.2 Wage regression results

The wage equation in (1) is first estimated for the full sample and then for each sub-period using both random-effects and fixed-effects regression techniques. To discern how the change in employment patterns and occupational choices may affect the wage penalty for motherhood, we estimate three regression specifications by introducing the variables for part-time workers and the dummy variables for occupation incrementally for each of the two dependent variables. For each sub-period, we also estimate a modified wage equation in which a motherhood dummy variable and its interactive term with the dummy for the state sector are introduced to explore the difference between the state and non-state sectors. The Hausman test is undertaken to determine which technique is appropriate. The results are reported in Tables 2-4.

Table 2 presents the estimates for the full sample period from 1990 to 2005. The Hausman test for each regression presented at the bottom of the table indicates that the individual fixed effects are endogenous and, thus, that the fixed-effect estimates are consistent, whereas the random-effects estimates are not. Given the Hausman test results, the discussion below focuses on fixed-effects estimates. With respect to the motherhood wage effect, we note that all of the estimates have a negative sign and are significant at the 10% level or higher for annual wages and at the levels of 11% to 12.6% for hourly wages. Quantitatively, introducing the part-time variable does not change the estimate of the motherhood effect for both annual wages and hourly wages, and further controlling for occupation choices increases the estimate for the two earnings variables rather than decreasing it. Thus, occupational choices do not appear to have been a major channel through

which child-bearing and -rearing adversely affected women's earnings for the full sample period. Based on the three specifications, the estimates show that holding other factors constant, motherhood reduces the annual earnings of urban women by 21.7% to 22.4% and hourly earnings by 17.8% to 18.6%. The closeness of the estimates for annual wages and hourly wages suggests that while a decrease in the labor hour supply associated with motherhood does not appear to be a major culprit that lowers mothers' annual earnings, the gap in annual earnings between mothers and childless women is largely attributable to the difference in wage rates. Given that wage rates are indicative of labor productivity, the aforementioned results suggest that child-bearing and -rearing disadvantages Chinese mothers primarily by lowering their productivity and hindering their work performance.

The results for other control variables are all consistent with economic intuition, reassuring us of the appropriateness of the model specification. The estimates for the educational attainment variables show that education has a significant, positive effect on earnings; for instance, women with a university degree earn about 50% to 56% more than women who did not graduate from high school. The two variables for experience are both highly significant, showing that earnings increase with experience but do so at a decreasing rate. Moreover, women who work part-time earn significantly less than those who work full-time on an annual basis, although the hourly wages are higher for the former than for the latter. Interestingly, the estimates for co-residence show that living with one's father or father in-law has a significant, negative effect on women's earnings for both measures, whereas living with one's mother or mother in-law has a positive effect on women's hourly wages (significant at the 10% level). Women appear to be disadvantaged when they take care of both their children and their male elderly parents.

The estimates of the two wage equations for the gradualist reform period (1990-1996) are presented in Table 3. The Hausman tests lead us not to reject the hypothesis that

individual fixed-effects are exogenous for most specifications,[8] suggesting that the random-effects estimates are efficient and consistent. According to the random-effects estimates, mothers earn slightly more than childless women according to both wage measures; however, the difference is statistically insignificant in all runs.

The estimates of the wage equations for the radical reform period (1999-2005) are reported in Table 4. As also seen in the test results for the full sample presented in Table 2, the Hausman test leads us to reject the random-effects model, and hence, our discussion below focuses on the fixed-effects estimates.[9] We find that motherhood decreases women's annual earnings by 34.3% (insignificant) and hourly wages by 45.1% (significant at the 5% level) in specification (1), in which the part-time and occupational variables are not accounted for. Introducing the part-time variable alone or together with occupational variables increases the motherhood wage effect from -34.3% to -40.5% (significant at the 10% level in both cases) for annual wages. These results suggest that the change in employment patterns and occupational choices did not cause the gap in annual earnings between mothers and childless women that appeared during the radical reform period. However, the estimated effect of motherhood on hourly wages falls from -45.1% to -40.8% (significant at the 10% level) when the part-time variable is accounted for, and the estimate rises slightly to -41.5% (significant at the 10% level) when occupational variables are added to the regression. The pattern of change for hourly wages indicates that part of the motherhood wage penalty that emerged during the radical reform period is attributable to the

[8] The Hausman test has a negative score for one regression for annual wages and one for hourly wages; the results are not presented.

[9] The Hausman test results that individual fixed effects are exogenous to wages for the gradualist reform period and become endogenous for the radical reform period should not come as a surprise. Given that the Chinese urban labor regime remained administratively managed in the gradualist reform period and became marketed oriented in the radical reform period, holding other factors constant, unobserved individual characteristics should have no effect on women's labor force participation and earnings in the former and begin to exert impacts on their decisions in the latter.

growing number of mothers who worked part-time or took low-paying jobs. Notably, the effect of motherhood on annual earnings is smaller than that on hourly wages in all three specifications, suggesting that mothers may have worked more hours on average than did childless women during the radical reform period.

The significant and large wage gaps between mothers and childless women for the radical reform period lend support to the conjecture that the privatization and labor market deregulation associated with the SOE-sector restructuring have increased the motherhood wage penalty. The estimates of the motherhood wage effect for post-restructuring urban China are comparatively much larger than those for industrial countries, which are typically about 10% to 15% (Waldfogel 1998). There are two main reasons for the distinction between these different levels of the motherhood wage penalty. First, as a "factory of the world", China has a relatively large manufacturing sector that absorbs a larger share of the female labor force than is the case in most industrial countries. The detrimental effects of child-bearing and -rearing on work performance are also greater in the manufacturing sector than in the service sector because the jobs in the former are physically more demanding than those in the latter. Secondly, the large wage penalty for motherhood in urban China relative to that in industrial countries may also imply that the labor market is more competitive in post-restructuring China than in many industrial countries. As a result, working mothers in China, as a group, received less state protection and support than did their counterparts in industrial countries.

Table 5 presents the estimates that indicate the contrast between the motherhood wage effects in the state and non-state sectors. We explore this difference by introducing an interactive dummy variable for motherhood and the state sector. To streamline the exposition, we only present the estimates for the specification that includes part-time work, occupations, and all other explanatory variables. Consistent with the results presented in Tables 3 and 4,

the Hausman test presented at the bottom of Table 5 does not lead us to reject the hypothesis that individual fixed effects are exogenous for the gradualist reform period but does lead us to reject that hypothesis for the radical reform period. Thus, our discussion focuses on the random-effects estimates for the gradualist reform period and the fixed-effects estimates for the radical reform period.

We note that motherhood has no significant effect on annual earnings or hourly wage rates for the gradualist reform period and that there is also no significant difference between the effect of motherhood on wages in the state and non-state sectors during this period according to the estimates of the interactive term. However, striking differences between the two sectors are found for the radical reform period. Looking at the estimates of the stand-alone motherhood variable, we note that motherhood decreases annual earnings by 58.6% and hourly wages by 59.0% for women in the non-state sector and that both estimates are significant at the 1% level. The interactive dummy for motherhood and the state sector has a positive sign and is significant the 1% level. Summing the estimates of the stand-alone and interactive dummy variables for motherhood yields an estimated effect of motherhood of -15.3% in terms of annual earnings and -17.2% in terms of hourly wages for the state sector, but none of the effects are statistically significant. These estimates support the conjecture that women in the state sector have received more protection than their sisters in the non-state sectors. As a result, the motherhood wage penalty in the non-state sector is much larger than that in the state sector.

6. Conclusions

In this paper, we have analyzed the impact of the economic transition on the wage gap between mothers and childless women in urban China using panel data from a nationally representative survey. We compared the two phases of the transition: the gradualist phase (1990-1996) and the period of radical reforms (1999-2005). We also explored the difference

between the state and non-state sectors. We found that the privatization and labor market deregulation that took place during the latter reform period have substantially increased the motherhood wage penalty and that the size of the penalty is much larger in the non-state sector than the state sector. The motherhood wage penalty that emerged in the radical reform period in China is markedly larger than that found in industrial countries. These findings suggest that the economic transition has shifted part of the cost of child-rearing from the state and employers back to women in the form of lower pay for working mothers. The plight of Chinese working mothers, especially those in the non-state sector, calls for feasible, effective policy interventions that help neutralize the adverse labor market consequences of child-bearing and -rearing for women in an era of globalization and economic deregulation.

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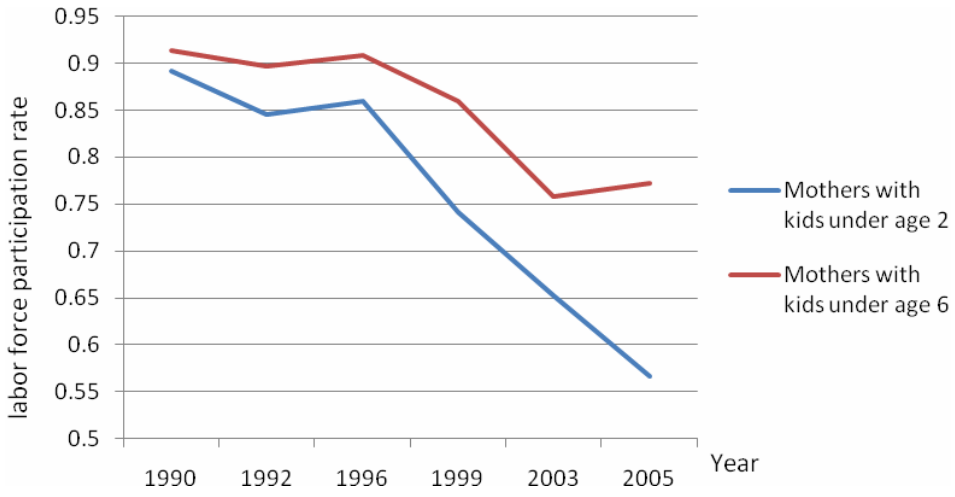

Fig 1. Labor force participaiton rates of mothers with young children

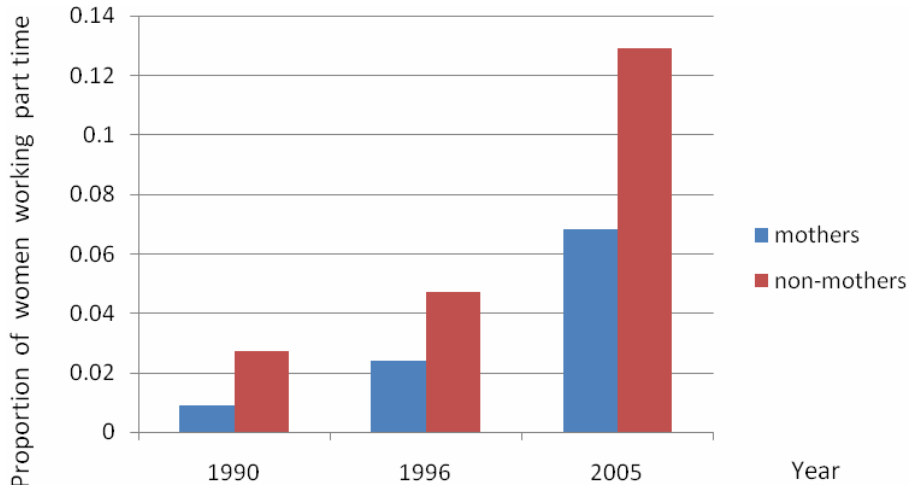

Fig 2. Proportion of mothers and childless women working parttime

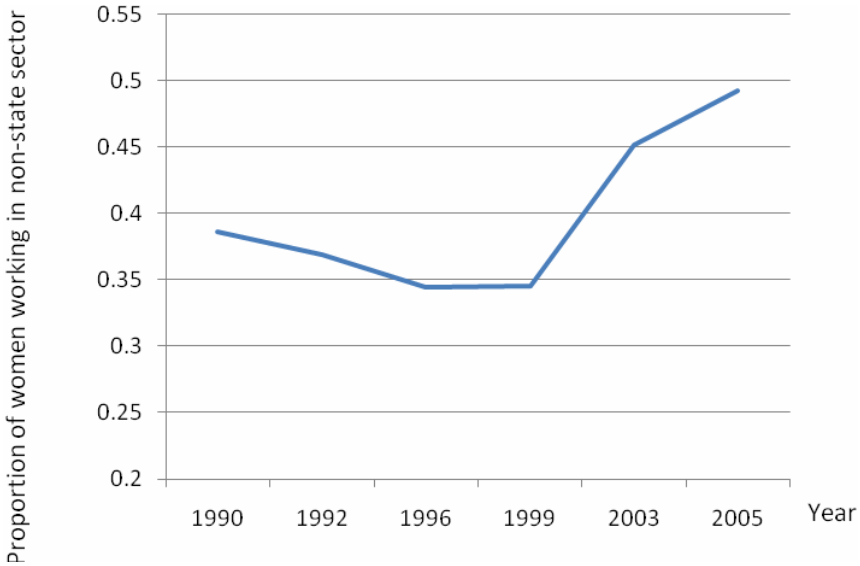

Fig 3. Proportion of women working in non-state sector

Table 1

Summary Statistics of Annual Earnings and Hourly Earnings

	Log Annual Earnings			Log Wage Rate		
	Childless Women	Mothers	Gap	Childless Women	Mothers	Gap
	(1)	(2)	(1) – (2)	(1)	(2)	(1) – (2)
1990-2005	8.350	8.559	-0.209***	0.667	0.860	-0.193***
	(0.038)	(0.019)	(0.041)	(0.038)	(0.020)	(0.043)
1990-1996	7.938	8.192	-0.254***	0.212	0.455	-0.243***
	(0.037)	(0.019)	(0.040)	(0.036)	(0.019)	(0.040)
1999-2005	8.943	9.020	-0.077	1.322	1.369	-0.046
	(0.053)	(0.029)	(0.063)	(0.049)	(0.029)	(0.062)
State sector	8.299	8.617	-0.318***	0.653	0.945	-0.292***
	(0.050)	(0.022)	(0.052)	(0.053)	(0.024)	(0.055)
Non-state	8.405	8.463	-0.058	0.683	0.719	-0.036
Sector	(0.057)	(0.035)	(0.068)	(0.056)	(0.035)	(0.067)

Notes：Mean values are presented with standard errors in brackets. ***, **, and * denote significance levels of 1%, 5% and 10%, respectively.

Table 2
Random-effects (RE) and Fixed-effects (FE) Estimates of the Earnings Equations, 1990-2005

	Log Annual Earnings						Log Wage Rate					
	(1)		(2)		(3)		(1)		(2)		(3)	
	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE
Motherhood	-0.112	-0.217*	-0.112*	-0.217*	-0.108*	-0.224**	-0.105*	-0.178	-0.104	-0.178	-0.0985	-0.186
	(0.068)	(0.117)	(0.062)	(0.112)	(0.063)	(0.113)	(0.063)	(0.117)	(0.064)	(0.117)	(0.064)	(0.116)
Graduate from college	0.623***	0.559***	0.582***	0.518***	0.519***	0.517***	0.619***	0.503***	0.638***	0.554***	0.559***	0.525***
	(0.057)	(0.177)	(0.055)	(0.171)	(0.063)	(0.171)	(0.055)	(0.177)	(0.054)	(0.178)	(0.062)	(0.179)
Graduate from Senior High	0.224***	0.167	0.207***	0.161	0.176***	0.161	0.226***	0.135	0.234***	0.143	0.194***	0.131
School	(0.040)	(0.116)	(0.038)	(0.110)	(0.041)	(0.110)	(0.037)	(0.114)	(0.037)	(0.116)	(0.040)	(0.117)
Experience	0.062***	0.096***	0.053***	0.091***	0.051***	0.092***	0.043***	0.081***	0.048***	0.087***	0.046***	0.083***
	(0.011)	(0.031)	(0.010)	(0.030)	(0.010)	(0.030)	(0.010)	(0.031)	(0.010)	(0.030)	(0.010)	(0.031)
Experience^2 $\times 100$	-0.127***	-0.172***	-0.106***	-0.162***	-0.103***	-0.164***	-0.083***	-0.131***	-0.093***	-0.143***	-0.090***	-0.142***
	(0.026)	(0.049)	(0.026)	(0.049)	(0.026)	(0.049)	(0.026)	(0.050)	(0.025)	(0.048)	(0.025)	(0.048)
Married	-0.051	-0.138*	-0.048	-0.117	-0.053	-0.117	-0.033	-0.077	-0.032	-0.103	-0.038	-0.108
	(0.046)	(0.077)	(0.046)	(0.078)	(0.046)	(0.077)	(0.049)	(0.077)	(0.048)	(0.076)	(0.047)	(0.075)
Work part-time			-0.830***	-0.529***	-0.835***	-0.521***			0.408***	0.659***	0.402***	0.644***
			(0.118)	(0.163)	(0.116)	(0.165)			(0.116)	(0.167)	(0.115)	(0.171)
Occupational variables	no	no	no	no	yes	yes	no	no	no	no	yes	yes
Collective Enterprise	-0.090**	-0.007	-0.091**	0.001	-0.067*	0.010	-0.096***	0.010	-0.096***	-0.000	-0.064*	0.014
	(0.038)	(0.061)	(0.037)	(0.060)	(0.037)	(0.059)	(0.036)	(0.061)	(0.036)	(0.058)	(0.036)	(0.058)
Private Enterprise	0.028	0.048	0.027	0.037	0.060	0.044	-0.132**	-0.063	-0.131**	-0.049	-0.071	-0.023
	(0.061)	(0.101)	(0.059)	(0.101)	(0.062)	(0.101)	(0.060)	(0.109)	(0.060)	(0.105)	(0.062)	(0.106)
Joint venture and foreign	0.121	0.137	0.183*	0.134	0.191**	0.083	0.129	0.014	0.097	0.018	0.118	0.046

invested enterprise	(0.118)	(0.195)	(0.098)	(0.173)	(0.097)	(0.177)	(0.094)	(0.187)	(0.094)	(0.173)	(0.094)	(0.191)
Live with Father or	-0.080	-0.233**	-0.098**	-0.251***	-0.102**	-0.256***	-0.118**	-0.329***	-0.110**	-0.307***	-0.117**	-0.316***
Father-in-law	(0.052)	(0.099)	(0.049)	(0.096)	(0.048)	(0.096)	(0.048)	(0.097)	(0.049)	(0.098)	(0.047)	(0.096)
Live with mother or	0.046	0.107	0.052	0.118	0.057	0.115	0.031	0.158*	0.028	0.145*	0.036	0.143*
mother-in-law	(0.051)	(0.082)	(0.048)	(0.080)	(0.048)	(0.080)	(0.049)	(0.085)	(0.049)	(0.086)	(0.048)	(0.085)
Hausman Test	22.57		44.43		51.34		27.01		38.07		44.23	
P value	0.094		0.000		0.001		0.029		0.002		0.005	
Overall R-squared	0.408	0.352	0.457	0.393	0.463	0.392	0.479	0.398	0.484	0.397	0.494	0.415
Between R-squared	0.374	0.305	0.444	0.359	0.449	0.354	0.476	0.370	0.476	0.363	0.484	0.380
Observations	2,212	2,212	2,212	2,212	2,212	2,212	2,212	2,212	2,212	2,212	2,212	2,212

Notes：Heteroscedasticity-robust standard errors reported in parentheses. ***, **, and * denote significance levels of 1%, 5% and 10%, respectively. The estimates for province and time dummy variables that are included in all regressions and occupational variables that are included in equation (3) are omitted to streamline the presentation.

Table 3
Random-effects and Fixed-effects Estimates of the Earnings Equations, 1990-1996

	Log Annual Earnings						Log Wage Rate					
	(1)		(2)		(3)		(1)		(2)		(3)	
	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE
Motherhood	0.027	-0.197	0.048	-0.145	0.057	-0.123	0.024	-0.138	0.014	-0.176	0.024	-0.149
	(0.073)	(0.149)	(0.070)	(0.146)	(0.070)	(0.146)	(0.069)	(0.143)	(0.069)	(0.144)	(0.069)	(0.142)
Graduate from college	0.307***	0.405	0.285***	0.346	0.210***	0.344	0.323***	0.426*	0.336***	0.469*	0.238***	0.440*
	(0.055)	(0.277)	(0.053)	(0.267)	(0.059)	(0.277)	(0.052)	(0.252)	(0.053)	(0.246)	(0.058)	(0.250)
Graduate from senior high	0.107***	0.232	0.095***	0.197	0.057	0.204	0.133***	0.192	0.140***	0.218	0.092***	0.209
school	(0.036)	(0.171)	(0.035)	(0.166)	(0.037)	(0.173)	(0.034)	(0.161)	(0.034)	(0.158)	(0.036)	(0.163)
Experience	0.035***	0.073	0.030***	0.052	0.026**	0.050	0.029***	0.063	0.032***	0.078	0.027**	0.065
	(0.012)	(0.060)	(0.011)	(0.056)	(0.011)	(0.057)	(0.011)	(0.052)	(0.011)	(0.051)	(0.011)	(0.051)
Experience^2 $\times 100$	-0.055*	-0.095	-0.045	-0.072	-0.037	-0.060	-0.042	-0.067	-0.048*	-0.083	-0.038	-0.059
	(0.029)	(0.074)	(0.027)	(0.070)	(0.027)	(0.071)	(0.027)	(0.072)	(0.027)	(0.069)	(0.026)	(0.070)
Married	-0.089	-0.199*	-0.104*	-0.159	-0.108*	-0.145	-0.100*	-0.116	-0.092	-0.145	-0.094*	-0.148
	(0.061)	(0.120)	(0.058)	(0.117)	(0.058)	(0.119)	(0.057)	(0.118)	(0.057)	(0.119)	(0.057)	(0.119)
Work part-time			-0.888***	-0.707***	-0.878***	-0.698***			0.504***	0.516**	0.515***	0.472**
			(0.159)	(0.239)	(0.158)	(0.255)			(0.137)	(0.211)	(0.135)	(0.219)
Occupational variables	no	no	no	no	yes	yes	no	no	no	no	yes	yes
Collective enterprise	-0.084**	0.002	-0.092**	0.017	-0.070*	0.007	-0.104***	0.037	-0.101***	0.026	-0.073**	0.028
	(0.039)	(0.078)	(0.038)	(0.077)	(0.038)	(0.076)	(0.037)	(0.078)	(0.037)	(0.076)	(0.036)	(0.075)
Private enterprise	0.442***	0.482***	0.455***	0.489***	0.487***	0.491***	0.290***	0.363**	0.282***	0.359**	0.333***	0.407***
	(0.084)	(0.155)	(0.082)	(0.155)	(0.087)	(0.159)	(0.085)	(0.156)	(0.083)	(0.144)	(0.087)	(0.152)
Joint venture and foreign	0.470***	0.589**	0.423***	0.496**	0.416***	0.424*	0.297*	0.212	0.319*	0.279	0.306*	0.371

invested enterprise	(0.133)	(0.275)	(0.133)	(0.224)	(0.139)	(0.237)	(0.167)	(0.278)	(0.166)	(0.244)	(0.179)	(0.259)
Live with Father or	-0.057	-0.232**	-0.057	-0.236**	-0.068	-0.233**	-0.058	-0.276***	-0.057	-0.273**	-0.070	-0.277***
Father-in-law	(0.055)	(0.103)	(0.055)	(0.104)	(0.054)	(0.103)	(0.054)	(0.107)	(0.054)	(0.106)	(0.053)	(0.105)
Live with mother or	-0.005	-0.033	-0.009	-0.042	0.000	-0.043	-0.021	-0.004	-0.019	0.002	-0.008	0.003
mother-in-law	(0.053)	(0.113)	(0.052)	(0.112)	(0.052)	(0.116)	(0.051)	(0.117)	(0.0511)	(0.118)	(0.050)	(0.123)
Hausman test	12.08		-		21.39		15.33		14.35		-	
P value	0.521		-		0.436		0.287		0.424		-	
Between R-squared	0.273	0.175	0.336	0.245	0.352	0.236	0.369	0.215	0.387	0.211	0.410	0.219
Overall R-squared	0.262	0.193	0.312	0.254	0.327	0.250	0.345	0.233	0.359	0.226	0.379	0.240
Observations	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253

Notes：Heteroscedasticity-robust standard errors reported in parentheses. ***, **, and * denote significance levels of 1%, 5% and 10%, respectively. The estimates for province and time dummy variables that are included in all regressions and occupational variables that are included in equation (3) are omitted to streamline the presentation. The Hausman test scores for equation (2) of log annual earnings and equation (3) of log wage rate are omitted, which have a negative value.

Table 4
RE and FE Estimates of the Earnings Equations, 1999-2005 (robust)

	Log Annual Earnings						Log Wage Rate					
	(1)		(2)		(3)		(1)		(2)		(3)	
	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE
Motherhood	-0.173	-0.343	-0.196**	-0.405*	-0.190*	-0.405*	-0.177*	-0.451**	-0.169*	-0.408*	-0.160	-0.415**
	(0.115)	(0.271)	(0.099)	(0.222)	(0.100)	(0.214)	(0.097)	(0.204)	(0.099)	(0.225)	(0.099)	(0.209)
Graduate from college	0.753***	0.652*	0.705***	0.612*	0.648***	0.567*	0.752***	0.515	0.769***	0.543	0.692***	0.464
	(0.093)	(0.334)	(0.088)	(0.319)	(0.101)	(0.312)	(0.088)	(0.344)	(0.087)	(0.346)	(0.100)	(0.357)
Graduate from senior high	0.366***	0.248	0.342***	0.249	0.319***	0.248	0.353***	0.174	0.362***	0.173	0.327***	0.157
school	(0.077)	(0.267)	(0.071)	(0.244)	(0.075)	(0.242)	(0.071)	(0.263)	(0.070)	(0.267)	(0.074)	(0.273)
Experience	0.081***	0.104*	0.067***	0.090	0.070***	0.084	0.051***	0.063	0.056***	0.073	0.058***	0.062
	(0.017)	(0.063)	(0.016)	(0.059)	(0.016)	(0.060)	(0.016)	(0.066)	(0.016)	(0.065)	(0.016)	(0.065)
Experience$^2\times100$	-0.187***	-0.154	-0.149***	-0.126	-0.156***	-0.118	-0.110***	-0.085	-0.124***	-0.105	-0.128***	-0.090
	(0.043)	(0.117)	(0.041)	(0.111)	(0.041)	(0.112)	(0.042)	(0.118)	(0.041)	(0.115)	(0.041)	(0.116)
Married	-0.047	-0.128	-0.042	-0.104	-0.054	-0.134	-0.001	-0.026	-0.002	-0.043	-0.017	-0.079
	(0.061)	(0.111)	(0.063)	(0.115)	(0.062)	(0.119)	(0.069)	(0.119)	(0.066)	(0.112)	(0.065)	(0.112)
Work part-time			-0.876***	-0.752***	-0.888***	-0.830***			0.325**	0.525	0.308*	0.445
			(0.149)	(0.256)	(0.146)	(0.259)			(0.161)	(0.349)	(0.158)	(0.348)
Occupational variables	no	no	no	no	yes	yes	no	no	no	no	yes	yes
Collective enterprise	-0.175**	-0.192	-0.147*	-0.159	-0.110	-0.125	-0.132	-0.160	-0.142*	-0.183	-0.0948	-0.160
	(0.077)	(0.150)	(0.077)	(0.152)	(0.080)	(0.150)	(0.080)	(0.154)	(0.078)	(0.150)	(0.079)	(0.147)
Private enterprise	-0.121	-0.220	-0.132*	-0.261*	-0.0960	-0.215	-0.284***	-0.299*	-0.280***	-0.271*	-0.206**	-0.220
	(0.074)	(0.148)	(0.070)	(0.145)	(0.080)	(0.148)	(0.070)	(0.161)	(0.069)	(0.157)	(0.080)	(0.156)
Joint venture and foreign	-0.077	-0.182	0.035	-0.043	0.061	0.069	0.023	-0.013	-0.016	-0.110	0.023	-0.010

invested enterprise	(0.150)	(0.192)	(0.127)	(0.156)	(0.128)	(0.143)	(0.114)	(0.200)	(0.117)	(0.191)	(0.120)	(0.169)
Live with father or	0.017	-0.038	-0.025	-0.049	-0.024	-0.028	-0.067	-0.160	-0.052	-0.152	-0.056	-0.158
father-in-law	(0.091)	(0.257)	(0.086)	(0.260)	(0.085)	(0.255)	(0.087)	(0.296)	(0.086)	(0.291)	(0.084)	(0.281)
Live with mother or	0.023	-0.010	0.050	0.028	0.059	0.038	0.006	0.071	-0.004	0.045	0.007	0.067
mother-in-law	(0.082)	(0.131)	(0.077)	(0.118)	(0.076)	(0.119)	(0.082)	(0.135)	(0.081)	(0.140)	(0.079)	(0.133)
Hausman test	145.89		158.73		193.28		72.54		75.35		94.06	
P value	0.000		0.000		0.000		0.000		0.000		0.000	
Observations	959	959	959	959	959	959	959	959	959	959	959	959
Between R-squared	0.187	0.061	0.266	0.143	0.270	0.147	0.219	0.125	0.226	0.112	0.234	0.105
Overall R-squared	0.201	0.081	0.275	0.162	0.282	0.173	0.223	0.133	0.230	0.121	0.243	0.122
Observations	959	959	959	959	959	959	959	959	959	959	959	959

Notes：Heteroscedasticity-robust standard errors reported in parentheses. ***, **, and * denote significance levels of 1%, 5% and 10%, respectively. The estimates for province and time dummy variables that are included in all regressions and occupational variables that are included in equation (3) are omitted to streamline the presentation. The Hausman test scores for equation (2) of log annual earnings and equation (3) of log wage rate are omitted, which have a negative value.

Table 5

Random-effects and Fixed-effects Estimates of Ownership Regressions,

1990-1996 and 1999-2005

	Log Annual Earnings				Log Wage Rate			
	1990-1996		1999-2005		1990-1996		1999-2005	
	RE	FE	RE	FE	RE	FE	RE	FE
Motherhood	-0.007	-0.211	-0.342***	-0.586***	-0.044	-0.260	-0.311***	-0.590***
	(0.092)	(0.170)	(0.120)	(0.208)	(0.089)	(0.168)	(0.120)	(0.207)
State Sector	-0.144**	-0.206*	-0.057	-0.271	-0.118*	-0.245**	0.046	-0.231
	(0.064)	(0.119)	(0.090)	(0.188)	(0.064)	(0.121)	(0.090)	(0.188)
Motherhood x	0.091	0.154	0.273***	0.433**	0.105	0.214	0.240**	0.418**
State Sector	(0.075)	(0.138)	(0.102)	(0.208)	(0.073)	(0.139)	(0.102)	(0.208)
Motherhood effect for state	0.084	-0.057	-0.069	-0.153	0.061	-0.046	-0.071	-0.172
	(0.165)	(0.067)	(0.101)	(0.223)	(0.098)	(0.053)	(0.103)	(0.265)
Graduate from college	0.216***	0.334	0.617***	0.545*	0.245***	0.432*	0.663***	0.444
	(0.062)	(0.278)	(0.102)	(0.315)	(0.060)	(0.249)	(0.099)	(0.359)
Graduate from senior high	0.053**	0.215	0.293***	0.270	0.090***	0.219	0.294***	0.180
school	(0.038)	(0.174)	(0.074)	(0.242)	(0.036)	(0.160)	(0.073)	(0.272)
Experience	0.023**	0.053	0.066***	0.108*	0.025**	0.067	0.054***	0.083
	(0.012)	(0.057)	(0.016)	(0.058)	(0.011)	(0.051)	(0.016)	(0.064)
Experience^2	-0.032	-0.063	-0.144***	-0.158	-0.033	-0.060	-0.115***	-0.124
$\times 100$	(0.028)	(0.070)	(0.041)	(0.109)	(0.027)	(0.068)	(0.041)	(0.114)
Married	-0.100	-0.105	-0.039	-0.101	-0.088	-0.117	-0.527	-0.048
	(0.063)	(0.124)	(0.060)	(0.115)	(0.060)	(0.124)	(0.064)	(0.110)

Work part-time	-0.850***	-0.699***	-0.875***	-0.784***	0.538***	0.472***	0.329**	0.482
	(0.162)	(0.260)	(0.144)	(0.251)	(0.137)	(0.235)	(0.157)	(0.39)
Live with father or	-0.093*	-0.247**	-0.019	0.016	-0.087*	-0.293***	-0.049	-0.111
father-in-law	(0.054)	(0.111)	(0.087)	(0.252)	(0.053)	(0.111)	(0.085)	(0.281)
Live with mother or	0.010	-0.053	0.051	0.043	-0.000	-0.004	-0.011	0.074
mother-in-law	(0.051)	(0.114)	(0.076)	(0.117)	(0.049)	(0.120)	(0.080)	(0.135)
Hausman test	19.78		180.97		20.97		87.33	
P value	(0.47)		(0.00)		(0.40)		(0.00)	
Between R-squared	0.305	0.184	0.280	0.121	0.385	0.189	0.246	0.077
Overall R-squared	0.284	0.201	0.289	0.143	0.357	0.211	0.251	0.093
Observations	1253	1253	959	959	1253	1253	959	959

Notes：Heteroscedasticity-robust standard errors reported in parentheses. ***, **, and * denote significance levels of 1%, 5% and 10%, respectively. Province, time and occupational dummy variables are included in all regressions and the estimates are omitted to streamline the presentation.

Appendix: Test for sample selection bias in the fixed-effects model

A sample selection test for the fixed-effects model is performed following the procedure developed by Wooldridge (1995). We first derive the inverse Mills ratio from a reduced-form selection probit equation below:

$$s_{it} = 1[x_i \gamma_{t2} + \varepsilon_{it} > 0] \qquad \text{(A1)}$$

where s is a dummy variable equal to one for those with positive wages and zero otherwise; x_i = (x_{it}, $\bar{x}_i$) includes the value of an explanatory variable for individual i in period t and its mean value for individual i over T periods for all explanatory variables, and ε is the error term.[10] The explanatory variables include education, age and its squared term, marital status, unearned income, co-residence with elderly parents or parents in-law, and province and year dummy variables. Following Gupta and Smith (2002), we introduce unearned income that is excluded from the earnings equation in the selection equation for identification. We derive the inverse Mills ratio by estimating the selection equation (A1) via pooled probit across i and t and then include the inverse Mills ratio in the fixed-effects earnings equation. According to Wooldridge (1995), the t statistic for the inverse Mills ratio in the fixed-effects earnings equation provides a valid test of sample selection bias regardless of whether A1 is the proper model of sample selection. We perform the test for annual earnings for the full sample period and for the two sub-periods and present the test results in Table A2. We note that in all cases, the inverse Mills ratio is statistically insignificant; we also note that including the inverse Mills ratio does not change the estimates of the motherhood wage effect very much. Thus, sample selection does not appear to be a serious concern given that unobserved individual fixed effects are controlled for.

[10] The specification follows the Mundlak (1978) approach, which uses $\bar{x}_i$ to control individual fixed effects for the selection equation.

Table A1

Summary Statistics of the Explanatory Variables

	Full Sample	Childless women	Mothers
Motherhood	0.780	0.000	1.00
	(0.414)	(0.000)	(0.00)
Graduate from college	0.146	0.201	0.130
	(0.353)	(0.401)	(0.336)
Graduate from Senior High School	0.442	0.441	0.442
	(0.497)	(0.497)	(0.497)
Age	33.821	25.215	36.244
	(6.959)	(5.313)	(5.234)
Experience	17.248	8.011	19.847
	(7.766)	(5.516)	(6.160)
Married	0.793	0.263	0.942
	(0.405)	(0.441)	(0.233)
Part-time work	0.062	0.089	0.055
	(0.242)	(0.285)	(0.228)
Urban collective	0.198	0.213	0.194
	(0.399)	(0.410)	(0.396)
Private enterprise	0.149	0.203	0.134
	(0.356)	(0.403)	(0.341)
Foreign joint venture and foreign invested firms	0.015	0.029	0.010
	(0.120)	(0.168)	(0.102)
State sector	0.602	0.522	0.625
	(0.490)	(0.500)	(0.484)
Live with father or father-in-law	0.258	0.714	0.130
	(0.438)	(0.452)	(0.336)
Live with mother or mother-in-law	0.342	0.814	0.209
	(0.474)	(0.390)	(0.406)
Observations	2,206	483	1723

Notes: The statistics for province, year, and occupation dummy variables are omitted to streamline the presentation.

Table A2

Selection Bias Test of Log Annual Earnings (FE)

	Log Annual Earnings		
	1990-2005	1990-1996	1999-2005
Motherhood	-0.200*	-0.139	-0.372*
	(0.111)	(0.148)	(0.229)
Inverse Mill's Ratio	0.376	0.081	0.783
	(0.295)	(0.515)	(0.540)
Graduate from college	0.534***	0.426*	0.791***
	(0.169)	(0.255)	(0.298)
Graduate from Senior High School	0.186	0.231	0.434*
	(0.115)	(0.159)	(0.241)
Experience	0.087***	0.073	0.100
	(0.031)	(0.054)	(0.061)
Experience^2 $\times 100$	-0.163***	-0.0938	-0.157
	(0.050)	(0.070)	(0.112)
Married	-0.085	-0.125	-0.131
	(0.073)	(0.108)	(0.117)
Part-time work	-0.484***	-0.533***	-0.624***
	(0.103)	(0.160)	(0.148)
Urban collective	0.001	0.021	-0.209
	(0.059)	(0.076)	(0.141)
Private enterprise	0.055	0.483***	-0.205
	(0.099)	(0.153)	(0.145)
Foreign joint venture and foreign invested firms	0.176	0.468**	-0.015
	(0.162)	(0.203)	(0.151)
Live with father or father-in-law	-0.263***	-0.192	-0.002
	(0.100)	(0.118)	(0.265)

Live with mother or mother-in-law	0.078 (0.081)	-0.125 (0.120)	0.032 (0.116)
Overall R-squared	0.395	0.223	0.153
Observations	2206	1173	959

Notes：Heteroscedasticity-robust standard errors reported in parentheses. ***, **, and * denote significance levels of 1%, 5% and 10%, respectively. Province and time dummy variables are included in all regressions and their estimates are omitted to streamline the presentation.